

### CROSS REFERENCE TO RELATED APPLICATIONS

5        This application claims the benefit of provisional patent  
application 60/141,757, filed June 30, 1999.

## TECHNICAL FIELD OF THE INVENTION

This invention relates generally to computer systems, and  
10 more particularly to the provision of help information and  
features for various software and hardware components of a  
computer system.

## BACKGROUND OF THE INVENTION

15       As the operating systems, applications, and hardware  
components of modern computer systems become increasingly  
complicated and offer more features and functions, even an  
experienced user would from time to time encounter questions  
relating to various aspects of her computer system. Such  
20 questions may include, for example, how to use a particular  
feature of an application or a hardware device, how to modify  
various settings of the system, how to find out what is wrong  
when the computer is not performing as expected and how to fix  
it, etc. In the early days of the personal computing era,  
25 each piece of computer software and hardware by reputable  
vendors typically came with one or more user's manuals, most  
of them tended to be either too voluminous and difficult for  
average users to use, or not comprehensive enough to provide  
answers to many questions a user might have. Moreover, many

5           As more computer processing power and system memory  
became available, there was a significant improvement in the  
way computer help information was provided to the users.  
Specifically, help information regarding a software program or  
a hardware device may be organized by the vendor of that  
10 product into different help topics that a user can access and  
view on the computer. For instance, if the user has question  
about a function or feature of an application, she can click  
on the help option on the menu bar and then try to find the  
help topic that provides the information. In addition to  
15 selected help topics, an application or device may provide  
tours and/or tutorials to teach the user how to use the  
features and functions of the product. As the Internet has  
become popular and widely accessible, many software and  
hardware vendors have also set up online support centers on  
20 the World Wide Web, where a user can search for technical  
information and obtain online technical support for diagnosis  
and troubleshooting. These newer approaches of providing help  
information have become so popular that many software and  
hardware products nowadays do not even come with old-fashioned  
25 paper manuals.

Nevertheless, even with all the help topics and online support available, a user today may still find it a

frustrating experience trying to locate the right help topics for her questions or problems concerning her computer system. Often, a question may be of a relatively general nature and could involve several software and hardware components, and the user has no idea which component is responsible for the problem. In order to find the answer, the user may have to go through the help contents of each of the components. Thus, with respect to the applications, the user has to launch each of the applications and search through the help topics it provides. Similarly, for a hardware component, the user has to locate and launch the help program for that component and then go through its help topics. If the answer still cannot be found, the user may have to access the various vendor Web sites and go through the information provided there. In doing so, the user often finds that the applications, hardware devices, and vendor Web sites each has its own way of organizing help contents and its own terminology, making it more difficult to navigate through the help contents to find the information needed. This process not only can be very time consuming but also can cause significant frustration of the user. The unsatisfactory user experience in finding useful help topics also leads to higher costs of technical support services of the software and hardware vendors, as a user encountering a problem may be more inclined to call for help rather than trying to find the answer by herself.

## SUMMARY OF THE INVENTION

In view of the foregoing, the present invention provides a framework that unifies help contents from different sources and provides a single point of entry through which a user may access help contents relating to different system software and hardware components. In this unified help framework, a help service maintains a database that contains data identifying a plurality of help topics pertaining to components of the computer system. The plurality of help topics are presented in a user interface based on the data in the database to allow a user to locate a help topic of interest. For instance, the help contents may be presented in accordance with a taxonomy structure that allows a user to navigate through easily to locate a help topic of interest. The user interface may also provide keyword and index search options. The contents of the help topics may reside locally or be accessible over the Internet, and may contain static as well as active components, such as scripts. The unified help framework is extensible, allowing the help topics and the taxonomy to be updated by means of update packages. The application for providing the unified presentation of help topics can be launched by a user as well as from programs.

Additional features and advantages of the invention will be made apparent from the following detailed description of illustrative embodiments, which proceeds with reference to the accompanying figures.

**BRIEF DESCRIPTION OF THE DRAWINGS**

While the appended claims set forth the features of the present invention with particularity, the invention, together with its objects and advantages, may be best understood from the following detailed description taken in conjunction with the accompanying drawings of which:

Figure 1 is a block diagram generally illustrating an exemplary computer system on which the present invention resides;

FIG. 2 is a schematic diagram showing an embodiment of a Help Center for providing access to help contents in accordance with the unified help framework of the invention;

FIG. 3 is a schematic diagram showing a user interface window provided by a Help Center Application that serves as a single point of entry for accessing help contents for multiple system components;

FIG. 4 is a schematic diagram illustrating an example of a taxonomy structure used in the user interface of FIG. 3 for presenting available help topics;

FIG. 5 is a schematic diagram showing a Compiled HTML file for storing help contents;

FIG. 6 is a schematic diagram showing a data structure in a Help Center Database for holding metadata for mapping help topics to the help taxonomy;

FIG. 7 is a schematic diagram showing an example of the contents of a Local Content Store of the embodiment of FIG. 2;

FIG. 8 is a schematic diagram showing an example of a Content Authentication Store of the embodiment of FIG. 2;

FIG. 9 is a schematic diagram showing the an update package for updating the Help Center of FIG. 2; and

5 FIG. 10 is a schematic diagram showing an example of a package description file in the update package of FIG. 9.

### DETAILED DESCRIPTION OF THE INVENTION

Turning to the drawings, wherein like reference numerals  
10 refer to like elements, the invention is illustrated as being implemented in a suitable computing environment. Although not required, the invention will be described in the general context of computer-executable instructions, such as program modules, being executed by a personal computer. Generally,  
15 program modules include routines, programs, objects, components, data structures, etc. that perform particular tasks or implement particular abstract data types. Moreover, those skilled in the art will appreciate that the invention may be practiced with other computer system configurations,  
20 including hand-held devices, multi-processor systems, microprocessor based or programmable consumer electronics, network PCs, minicomputers, mainframe computers, and the like.

The invention may also be practiced in distributed computing environments where tasks are performed by remote processing  
25 devices that are linked through a communications network. In a distributed computing environment, program modules may be located in both local and remote memory storage devices.

The hard disk drive 27, magnetic disk drive 28, and optical disk drive 30 are connected to the system bus 23 by a hard disk drive interface 32, a magnetic disk drive interface 33, and an optical disk drive interface 34, respectively. The drives and their associated computer-readable media provide nonvolatile storage of computer readable instructions, data structures, program modules and other data for the personal

25 drives and their associated computer-readable media provide  
nonvolatile storage of computer readable instructions, data  
structures, program modules and other data for the personal

computer 20. Although the exemplary environment described herein employs a hard disk 60, a removable magnetic disk 29, and a removable optical disk 31, it will be appreciated by those skilled in the art that other types of computer readable media which can store data that is accessible by a computer, such as magnetic cassettes, flash memory cards, digital video disks, Bernoulli cartridges, random access memories, read only memories, and the like may also be used in the exemplary operating environment.

10 A number of program modules may be stored on the hard disk 60, magnetic disk 29, optical disk 31, ROM 24 or RAM 25, including an operating system 35, one or more applications programs 36, other program modules 37, and program data 38. A user may enter commands and information into the personal  
15 computer 20 through input devices such as a keyboard 40 and a pointing device 42. Other input devices (not shown) may include a microphone, joystick, game pad, satellite dish, scanner, or the like. These and other input devices are often connected to the processing unit 21 through a serial port  
20 interface 46 that is coupled to the system bus, but may be connected by other interfaces, such as a parallel port, game port or a universal serial bus (USB). A monitor 47 or other type of display device is also connected to the system bus 23 via an interface, such as a video adapter 48. In addition to  
25 the monitor, personal computers typically include other peripheral output devices, not shown, such as speakers and printers.

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When used in a LAN networking environment, the personal computer 20 is connected to the local network 51 through a network interface or adapter 53. When used in a WAN networking environment, the person computer 20 typically includes a modem 54 or other means for establishing communications over the WAN 52. The modem 54, which may be internal or external, is connected to the system bus 23 via the serial port interface 46. In a networked environment, program modules depicted relative to the personal computer 20, or portions thereof, may be stored in the remote memory storage device. It will be appreciated that the network connections shown are exemplary and other means of establishing a communications link between the computers may be used.

5 that such acts and operations, which are at times referred to  
as being computer-executed, include the manipulation by the  
processing unit of the computer of electrical signals  
representing data in a structured form. This manipulation  
transforms the data or maintains it at locations in the memory  
10 system of the computer, which reconfigures or otherwise alters  
the operation of the computer in a manner well understood by  
those skilled in the art. The data structures where data is  
maintained are physical locations of the memory that have  
particular properties defined by the format of the data.

15 However, while the invention is being described in the foregoing context, it is not meant to be limiting as those of skill in the art will appreciate that various of the acts and operation described hereinafter may also be implemented in hardware.

20 Referring now to FIG. 2, the present invention is directed to a framework for providing access to help contents that offers unified organization and presentation of help topics and other types of user-help features, such as trouble shooting and tutorials, etc., to enable a user to get the  
25 needed help easily and quickly. A feature of the invention is the provision of a single point of entry (or portal) through which the user can find help contents pertaining to various

software and hardware components installed on the computer system, and such help contents may be either stored locally or obtained online and include both static and active contents. By providing all help features through a single point of entry  
5 in an organized and coherent way that facilitates easy navigation, the unified help framework of the invention eliminates the major cause of user frustration in getting needed help with conventional systems. The user no longer has to search for help topics and features that are scattered all  
10 over the system and various vendor Web sites and can only be accessed by launching individual applications or connecting to individual Web sites.

FIG. 2 shows an embodiment of the unified help framework in accordance with the invention. In this embodiment, the  
15 unified help functionality is provided by a Help Center 70. The main architecture of the Help Center 70 is made up by the following components: a Help Center Application 72, a Help Center Database 74, a Help Center Update program 76, a Script Library 78, a Local Content Store 80, a Content Authorization  
20 Store 82, and a Support Automation Framework (SAF) Registration Store 84. The functions of each of these components and how they interact to provide the unified help are described in greater detail below.

Turning first to the Help Center Application (HCAApp) 72,  
25 this component is the center piece of the architecture of the Help Center 70 and cooperates with the other components to provide the unified help functionality. One function of the

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HCApp 72 is to provide the single point of entry for accessing all available help contents as described above. To that end, the HCApp 72 is responsible for providing a user interface that presents the available help topics and other help options for all software and hardware components of the computer system in a well-organized form that the user can navigate through to locate the desired help contents. In one implementation, the primary mode of display of user interface is an Internet Explorer (Microsoft) browser control, and the various help contents are included in HTML pages that may be static or have active contents, such as scripts.

For illustration purposes, an exemplary user interface window 90 that may be presented by the HCApp 72 as a home page is shown in FIG. 3. In this exemplary user interface, a navigation bar 92 provides direct access to top-level pages, home, back, and exit functionality. A portion 96 of the core area of the window, which is entitled "Look for help" in the illustrated example, presents a taxonomy structure, which will be described in greater detail below, for the user to locate relevant help topics. Another portion 98 of the window 90 provides other help options, such as viewing tours and tutorials, finding a help topic in an index of help topics, etc. A search bar 100 allows the user to enter a keyword for a keyword search on the available help contents. The window also includes a portion 102 that presents a list of help topics that have been used recently. In accordance with an aspect of the invention, active help contents may be offered

5           As the user goes through the process of locating the help  
information, the core area of the window 90 can also be used  
to present new user interface information depending on  
selections made by the user. For instance, the core area may  
be used to display actual help contents or search results if  
10 the user selects a help topic or performs a keyword search.  
The user interface for self-help problem fix or support  
automation for escalating problems to a vendor will also be  
displayed in the same core area. In this regard, the author  
of support automation help pages is given significant  
15 flexibility in deciding what kind of user interface (e.g.,  
HTML plus JavaScript, etc.) and how many pages to be  
displayed.

In accordance with a feature of the embodiment, the available help topics are organized in a taxonomy structure, which is presented by the HCAApp 72 in its user interface window. The user can navigate through this taxonomy structure to locate relevant help topics. Generally, the taxonomy structure is based on a hierarchical model in which the help topics are categorized into a tree-like structure with multiple layers of categories and sub-categories. For illustration purposes, an exemplary taxonomy structure 110 is shown in FIG. 4, where A1, A2, etc. represent categories and

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The help topics in the taxonomy are the leaf nodes in the tree-like structure. In other words, a help topic does not have child nodes. Each help topic, however, may have multiple parents as shown in FIG. 4. Thus, the same help topic may exist under different taxonomy branches. In a preferred embodiment, in addition to the taxonomy structure, help topics may also be located by using a help topic index or a keyword search. It will be appreciated that not all available help topics have to be mapped into the taxonomy. For example, some help topics that are intended to be located by a keyword search may not quite fit in the taxonomy.

In a preferred embodiment, the help contents are contained in pages in the HTML (Hypertext Markup Language) and may include scripts (e.g., JavaScripts, VBScripts) and objects (e.g., applets, ActiveX/COM). The contents of a help topic  
25 may also have links or buttons that can be selected to launch other applications, applets, etc. The help contents stored locally on the computer system are preferably in the form of

Compiled HTML (CHM) Help Files. As shown in FIG. 5, a CHM Help File 116 contains one or more HTML files 120 that provide contents for the associated help topic, a file 122 (referred to as an HHC file) which provides a table of contents for the CHM file, and a file 124 (referred to as an HHK file) that contains an index of the contents. Additionally, as will be described below, a file 144 (FIG. 9) (referred to as an HHT file) that contains "metadata" is used for providing the mapping between the individual help topics and the taxonomy structure. In one implementation, the HHT file 144 is written in the eXtensible Markup Language (XML) and specifies for each help topic in the CHM file the following data: the taxonomy node under which the help topic resides, the URL for the help topic, the title for the help topic, the keywords for help topic, and an optional description of the help topic. The HHT file may also contain an Action field for the help topic to specify whether the contents or mapping of the topic is being added, removed, or updated.

In accordance with a feature of the embodiment, each help topic is associated with a Universal Resource Locator (URL) that can be used to access the contents of that help topic. One important effect of using URLs to access help contents is that there is no distinction between local contents or online contents. Thus, in the case that the URL refers to a local directory, the HCAApp will retrieve the contents of the help topic from that local memory space. On the other hand, if the URL refers to a directory on the Internet, such as a vendor's

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5        In a preferred embodiment, the HCAApp 72 may be launched either by a user or from within an application. To launch the HCAApp, the user may, for example, select the Help menu item from the Start menu. Alternatively, the HCAApp may be launched by an application by calling a proper API of the system.

20        hcp://<content-address>,  
      where <content-address> may be any of the following:

	<content-address>	Description
	-----	-----
25	<HTTP URL>	Extracts the contents of the URL and displays them in the browser, no matter where the contents reside.

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C=US/memorystick.htm

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http://system/Taxonomy.htm?path=Security

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For illustration purposes, FIG. 6 shows an exemplary data structure in the form of a table 130 in the HC Database 74 for

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mapping the help topics to the taxonomy. There is one entry for each node in the hierarchy of the taxonomy structure. Each entry contains the following fields: an ID uniquely identifying that node, a parent ID for that node (which is NULL for top-level nodes), the display name of the node, a description (optional) of the node. If the node is a help topic (i.e., a leaf node of the taxonomy), the entry also includes a URL field containing a URL for retrieving the help contents, a keyword field that contains the keywords for identifying this help topic in a keyword search, and an index string for indexing the topic. It will be appreciated that this table in FIG. 6 is shown only as a simple example, and the entry in the database may include other fields relating to the help topic. For instance, such fields may include the type of help (e.g., help information, tutorial, diagnosis, etc.) provided, an identification of the owner of the help contents (i.e., the party that provides the help contents), etc.

In the illustrated embodiment, the various help contents installed on the computer system are all registered in the local content store. The use of the local content store addresses another aspect of security concerns relating to having multiple sources for the help contents stored locally on the computer system. Specifically, one vendor should not be allowed to tamper with the help contents provided by another vendor. As will be described in greater detail below, addition and modification of trusted contents may be by means

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As mentioned above, the help contents for a help topic may be active, i.e., including active components such as scripts. For instance, certain help contents provided by a vendor may provide a fix to a known problem, which may involve the use of scripts to change system settings or modify certain files. Another important and related use of scripts is for support automation, where a user presents (or "escalates") an encountered problem to a support center of the vendor over the Internet. In such a case, the vendor may provide script-based support applications (called "support channels") to collect various system operation information for problem diagnosis and upload such information to the Vendor. Moreover, once the problems are identified, fixes can also be implemented by providing scripts to the computer to perform the corrective actions.

15 Access to the Script Library objects is allowed only if the  
URL is found in the Content Authorization Store 82.

As mentioned above, the HCAApp 72 preferably uses the Internet Explorer browser control as the primary mode of viewing the contents of a help topic, which may be active and include scripts. The IE browser control has a built-in security mechanism that will detect unknown or untrusted scripts included in the content pages and provide warnings to the user or refuse to execute such scripts. For active help contents that include scripts, the security mechanism of the IE browser control can be disruptive and may hinder the proper execution of the scripts. To avoid this problem, the trusted active contents that are registered in the Content

5           As mentioned above, one important form of active help  
contents is a script-based support application provided by a  
vendor for automated support. Before such support  
applications can be used, the applications and their vendors  
have to be registered with the Support Automation Framework  
10 (SAF) Registration Store 84 (FIG. 2). The SAF Registration  
Store keeps information for registered vendors and information  
specific to the support applications.

One important feature of the unified help framework of the invention is its extensibility. In a preferred embodiment, various help contents can be added to or removed from the computer system, and their taxonomy mapping, index, and search keywords can be changed, by means of an update package. As shown in FIG. 9, in one implementation, the update package 140 is a single cabinet (CAB) file that may contain information for updating the HC Database, SAF Registration Store, the Content Store, and the local file system. For security reasons, the CAB file is preferably signed. The CAB file may have compressed therein a package description file 142, one or more HHT files 144, SAF Config files 146, and update contents 148. All of these components in the package except the Package description file are optional. The package description file 142, which is an XML

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5 description file 142 is shown in FIG. 10. The HHT file 144,  
as described above, provides the mapping between the topics in  
the update contents 148 (if any) and the taxonomy. The SAF  
Config file 146 is used for registering with or removing from  
the SAF registration store a vendor connection through which  
10 active help contents may be accessed. The content portion of  
the update file contains CHM files as described above, HTML  
pages, or other things that are to be copied to the local file  
system. Contents that are copied to the local file system for  
use under the hcp:// namespace are stored on a per vendor  
15 basis under the main Help Center directory.

When the Help Center (HC) Update program 76 receives the update package 140, it first verifies that the package is signed by a proper authority to ensure that the package did come from a trusted source, such as a vendor. To this end, the package includes a certificate 150 (FIG. 9) that holds the vendor's name, a public key and other information, all of which are signed by the Certificate Authority using a private key. The HC Update program uses the certificate management APIs of the operating system to verify that the certificate was not tampered with. The certificate management APIs are also used to extract the name and identification data of the vendor from the certificate.



If the contents portion of the package includes data that are  
15 identified as TRUSTED\_CONTENT in the package description file,  
such "trusted contents" are used to update the Contents Store.

In view of the many possible embodiments to which the principles of this invention may be applied, it should be recognized that the embodiment described herein with respect to the drawing figures is meant to be illustrative only and should not be taken as limiting the scope of invention. For example, those of skill in the art will recognize that the elements of the illustrated embodiment shown in software may be implemented in hardware and vice versa or that the illustrated embodiment can be modified in arrangement and detail without departing from the spirit of the invention. Therefore, the invention as described herein contemplates all

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